

## Original Article

# Are we still misdiagnosing clubfoot? A study of non-clubfoot cases labeled or referred as clubfoot from primary care centers in Uttarakhand

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## ABSTRACT

**Background:** Clubfoot is a congenital disorder identifiable with the clinical assessment itself, provided the knowledge of key features is sound. Several disorders affecting the foot and lower limb that present with crooked or bent anatomy may be confused with it. Knowledge of common disorders that mimic clubfoot in a particular region is thus important to adequately distinguish, manage or refer the case to specialist opinion. **Objectives:** The current study attempts to provide an overview and documentation of the conditions referred and labeled as clubfoot from primary care facilities, the knowledge of which is important so that appropriate treatment is given to each. The findings will reflect lacunae in the knowledge and perception of primary healthcare workers regarding the deformity. **Materials and Methods:** A retrospective assessment of all cases referred to our dedicated clubfoot clinic with a diagnosis of clubfoot by peripheral health-care facility was done from September 2016 to October 2017. Relevant demographic details including that of parents, type of deformity, nature, laterality, and treatment received were noted for each case. Conditions requiring non-operative treatment and those requiring further evaluation were noted separately with a detailed description. **Results:** Out of total 97 cases labeled as clubfoot, 32 (33.68%) cases with 64 feet were part of the study after excluding true clubfoot cases. The common condition noted was calcaneovalgus, postural clubfoot, equinus deformity secondary to cerebral palsy, metatarsus adductus, in-toeing, and posteromedial bowing of tibia. **Conclusion:** The knowledge of common foot disorders in primary care settings should be strengthened by refresher practical training so that these disorders are diagnosed and managed there an appropriate referral is made thus leading to decrease the burden on higher centers.

**Key words:** Anomaly, Child, Clubfoot, Congenital, Deformity, Diagnosis, Foot disorders

The clubfoot is a common congenital disorder and consists of well-described set of unilateral or bilateral foot deformities that are not passively correctable. Its incidence reported is 2.03/1000 live births in low- and middle-income countries, and there is evidence of increasing incidences with time [1,2]. This deformity can be easily recognized due to evident and striking anomalous outlook and most, if not all, cases are brought to primary care facility for consultation and then treated there or referred to higher centres. The acronym CAVE describes key deformities of clubfoot as cavus of foot (increased arches), adduction of forefoot, varus of hindfoot, and equinus at ankle. Easily identifiable physical features are well described in the literature and are clinically evident [2,3]. The basic medical textbooks have dedicated chapters describing relevant details of this deformity to help even primary care doctor to diagnose or refer it to appropriate center.

Due to the lack of objective assessment method, non-specialist practitioners though sometimes may find it difficult to diagnose it [4]. Subsequent inappropriate treatment complicates the deformity. Due to complex nature of pediatric lower limb deformities, deformities with myriad features are referred with

a diagnosis of clubfoot to a dedicated clinic either fresh or after a trial of various treatment methods. The understanding of deformities that are referred to us and those which are not clubfoot is thus essential to tabulate them. The findings of the study will serve as the basis of an educative initiative planned for peripheral healthcare workers to help them identify and differentiate common foot deformities from clubfoot.

## MATERIALS AND METHODS

A retrospective evaluation of all consecutive cases was done that were referred to our dedicated twice-a-week clubfoot clinic with labelled diagnosis of clubfoot. At our centre, a careful distinction of true clubfoot cases was done and remaining non-clubfoot cases were part of the study. The study period was from September 2016 to October 2017 in a tertiary care center that is also a teaching institute. All cases from birth and up to 15 years of age were included in the study. Cases which were referred to us from the other or same hospital were included. Cases managed previously or elsewhere with indigenous or modern methods of treatments were also included, if they had prior records.

Cases brought by parents or relatives directly, those not having any record, those not willing to continue treatment and non-compliant were excluded from the study. Patient characteristics, demographics, type of deformity, laterality, and management were noted for each of the cases. The diagnosis in cases of bone clubfoot cases was ascertained clinically for each case after ruling out clubfoot. Treatment done in those cases and a follow-up to 6 months was done for each case. Associated conditions or deformities including syndromic cases were also recorded along with relevant birth history. All cases were included following written consent of parents or guardian, and those with clubfoot underwent free plaster, braces, and supervised follow-up.

## RESULTS

A total of 32 cases out of 97 (33.68%) were identified as non-clubfoot cases as diagnosed chiefly by clinical evaluation with the assistance of other investigation if required and were part of the study. The proper documentation of the deformities was done, and relevant patient and demographic details were enlisted for each. Calcaneovalgus was found to be the most common of these deformities (28.12%) followed by postural clubfoot (18.75%), equinus deformity associated with cerebral palsy (15.62%), and metatarsus adductus (12.5%). Postural clubfoot cases resemble clubfoot but in contrast to true clubfoot their deformities are passively correctable to large extent, and usually, the dorsum of the foot can be touched to shin of the same side (Fig. 1). Calcaneovalgus deformity does not involve inward bending of foot but still is referred as clubfoot. In this, the ankle is in calcaneus posture with toes facing upward and sole of the foot not plantigrade, but this is usually self-correcting disorder or may in extreme cases, require one or two plasters to correct (Fig. 2).

In-toeing due to increased femoral anteversion was among lesser common deformities equaling posteromedial bowing of tibia in 9.37% cases followed by congenital vertical talus (CVT) in 2 cases (Table 1). Most of the children presented within 1<sup>st</sup> month of life (24 cases, 75%) while rest of the cases were presented within a year and only five cases of equinus presented after 4 years. Male children were commonly affected (62.5%) than female counterparts. The calcaneovalgus deformities were managed by stretching, and watchful neglect along with periodic observation and all of these were spontaneously corrected over the follow-up period. Postural clubfoot resembled clubfoot, but usually, heel varus was not evident, and the foot was passively corrected. Equinus deformity was found to be related to spastic cerebral palsy among other clinical features. These were advised physiotherapy referral for the management with or without appropriate braces.

Metatarsus adductus (Figs. 3a and 3b) was also under follow-up and was prescribed modified footwear by orthotist. In-toeing, mostly a result of increased femoral anteversion, is a common finding and usually resolves with time when the anteversion achieves the adult pattern. These cases were assured and explained the future course and treatment as per the later morbidity. Posteromedial bowing (Fig 3c) is rare deformity and



**Figure 1:** The postural clubfoot deformity in a newborn from front (a) but the dorsum of foot could touch shin thus excluding true clubfoot (b)



**Figure 2:** The calcaneovalgus deformity in a newborn (a) from front (better appreciated in left foot) and lateral view (b)

observed in 3 cases that were later managed conservatively by physiotherapy or splints, and two children in our study have witnessed improvement with supervised treatment and are still under follow-up. CVT is deformity that results in a foot shaped like a boat and was diagnosed on clinical features and radiographs in maximal plantar and dorsiflexion showing vertical talus and non-alignment of navicular and talus bone on the lateral view.





**Figure 3:** Bilateral metatarsus adductus deformity (a) with plantar view. (b) The posteromedial bowing deformity of the left side in an infant (c)

**Table 1: The non-clubfoot deformities and patient demographics**

Deformity	Male	Female
Calcaneovalgus	5	4
Postural clubfoot	5	1
Equinus	3	2
Metatarsus adductus	3	1
In-toeing	-	3
Posteromedial bowing	2	1
CVT	2	-

CVT: Congenital vertical talus

These were managed by reverse ponseti casting with a good outcome. All the cases of clubfoot, on the other hand, underwent serial corrective casting as per ponseti protocol and registered in clubfoot clinic.

## DISCUSSION

The conditions that result in the abnormal shape of feet are likely to be misdiagnosed as clubfoot due to lack of knowledge about key differentiating features resulting in inappropriate treatment. The knowledge of characteristic features for diagnosis and that of standard treatment is the key factor to decrease the burden of untreated or wrongly treated deformities. Presence of all described deformities in the foot as signs of clubfoot and not just

one of the CAVE deformities is essential to proper diagnosis. We could not find studies that describe prevalence or characterization of deformities that are misdiagnosed as clubfoot leading to either no or under-treatment. The treatment, that should start as early as possible, usually includes serial periodic corrective casting and is inexpensive and effective standard protocol [1,4]. The untreated deformity leads to long-term disability and suboptimal function.

The clubfoot if diagnosed early has a better chance of uneventful recovery leading to a painless and plantigrade foot. The follow-up and compliant foot abduction bracing have an important role in preventing recurrences and recurrences require adequate management depending on the deformity [5]. In our study, clubfoot cases were readily identified by assessing key deformities and cases which were not clubfoot were also distinguishable. Many times, recurrent deformities may require keen observation to not neglect them by misdiagnosis. A good clinical assessment is required and advocated to evaluate the child at presentation to diagnose the deformity early, and the older child can be examined while standing, running or by observing the gait if possible [6].

Calcaneovalgus deformity, a common occurrence in our study is often postural and managed conservatively in most cases by us with success. Late-presenting or residual calcaneovalgus may pose challenges to treatment and thus should be managed early [7]. Equinus deformity with associated cerebral spastic palsy was assessed, and stretching and physiotherapy were advised as the children were young with passively correctable deformities. A proper follow-up was explained for future management as per the severity of the equinus. Metatarsus adductus cases were also managed conservatively with watchful neglect in one case and casting in the rest. There is strong evidence that flexible cases have a good outcome with conservative approaches [8]. Parents were advised appropriate management according to future residual deformity.

In-toeing deformities were found to be related to physiological excessive femoral anteversion and were clinically tested with sitting position in W manner as described by Williams *et al.* [9]. Most of the time, this is supposed to rectify itself at appropriate time. Parents require good counseling for seemingly awkward gait and watchful observation over time. Two cases of CVT were identified with characteristic fixed deformities. It is important that CVT and calcaneovalgus be diagnosed well as treatment might differ in certain cases [10]. All cases were diagnosed clinically with one case required additional radiograph. The reverse ponseti casting was initiated in both kids with satisfactory results. Reverse ponseti casting is inexpensive method well described and used by many and was chosen on the basis of it being a simple, conservative approach [11]. The follow-up for recurrence was initiated with the option of surgical intervention well explained to parents if need be, while one of the kid was lost to follow-up after 4 months.

Posteromedial bowing of tibia is a rare entity with few reports or small series described in literature. Rapid resolution in phases has been seen in this deformity through physal realignment and

diaphyseal remodeling [12]. Our cases were also given plasters initially, and later appropriate custom braces and all showed improvement. While all are still undergoing treatment, there is marked improvement, and we plan to continue it with surgeries reserved for residual deformity.

A good epidemiological study is said to be important for any research about the deformity as it lays the foundation for future work [13]. A brief tabulation of common mimics is also important in this pretext due to the risk of misdiagnosis or neglect in untrained centers. Our study is a single center experience to profile common conditions that may pose a problem in the underdeveloped region, and proper identification of those at primary care level may decrease undesired consultation and agony of the patient and caregiver alike.

## CONCLUSION

The lessons are drawn from this study advocate basic training to all primary care centers to identify and treat clubfoot in a standard manner and refer the difficult cases to suitable centers. Easy identification and differentiation of closely resembling deformities will ensure proper diagnosis and appropriate treatment.

## REFERENCES

1. Smythe T, Kuper H, Macleod D, Foster A, Lavy C. Birth prevalence of congenital talipes equinovarus in low- and middle-income countries: A systematic review and meta-analysis. *Trop Med Int Health* 2017;22:269-85.
2. Krogsgaard MR, Jensen PK, Kjaer I, Husted H, Lorentzen J, Hvass-Christensen B, *et al.* Increasing incidence of club foot with higher

population density: Incidence and geographical variation in Denmark over a 16-year period - An epidemiological study of 936,525 births. *Acta Orthop* 2006;77:839-46.

3. Dobbs MB, Gurnett CA. Update on clubfoot: Etiology and treatment. *Clin Orthop Relat Res* 2009;467:1146-53.
4. Nordin S, Aidura M, Razak S, Faisham WI. Controversies in congenital clubfoot: Literature review. *Malays J Med Sci* 2002;9:34-40.
5. Dietz FR. Treatment of a recurrent clubfoot deformity after initial correction with the Ponseti technique. *Instr Course Lect* 2006;55:625-9.
6. Andriesse H, Hagglund G, Jarnlo JB. The clubfoot assessment protocol (CAP): Description and reliability of a structured multi-level instrument for follow-up. *BMC Musculoskelet Disord* 2005;6:40.
7. Muir D, Angliss RD, Nattrass GR, Graham HK. Tibiotalocalcaneal arthrodesis for severe calcaneovalgus deformity in cerebral palsy. *J Pediatr Orthop* 2005;25:651-6.
8. Williams CM, James AM, Tran T. Metatarsus adductus: Development of a non-surgical treatment pathway. *J Paediatr Child Health* 2013;49:E428-33.
9. Sass P, Hassan G. Lower extremity abnormalities in children. *Am Fam Phys* 2003;68:461-8.
10. McKie J, Radomisli T. Congenital vertical talus: A review. *Clin Podiatr Med Surg* 2010;27:145-56.
11. Bhaskar A. Congenital vertical talus: Treatment by reverse ponseti technique. *Indian J Orthop* 2008;32:347-50.
12. Shah HH, Doddabasappa SN, Joseph B. Congenital posteromedial bowing of the tibia: A retrospective analysis of growth abnormalities in the leg. *J Pediatr Orthop B* 2009;18:120-8.
13. Engesaeter LB. Increasing incidence of clubfoot: Changes in the genes or the environment? *Acta Orthop* 2006;77: 837-8.

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